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SCIENCE NEWS LETTER

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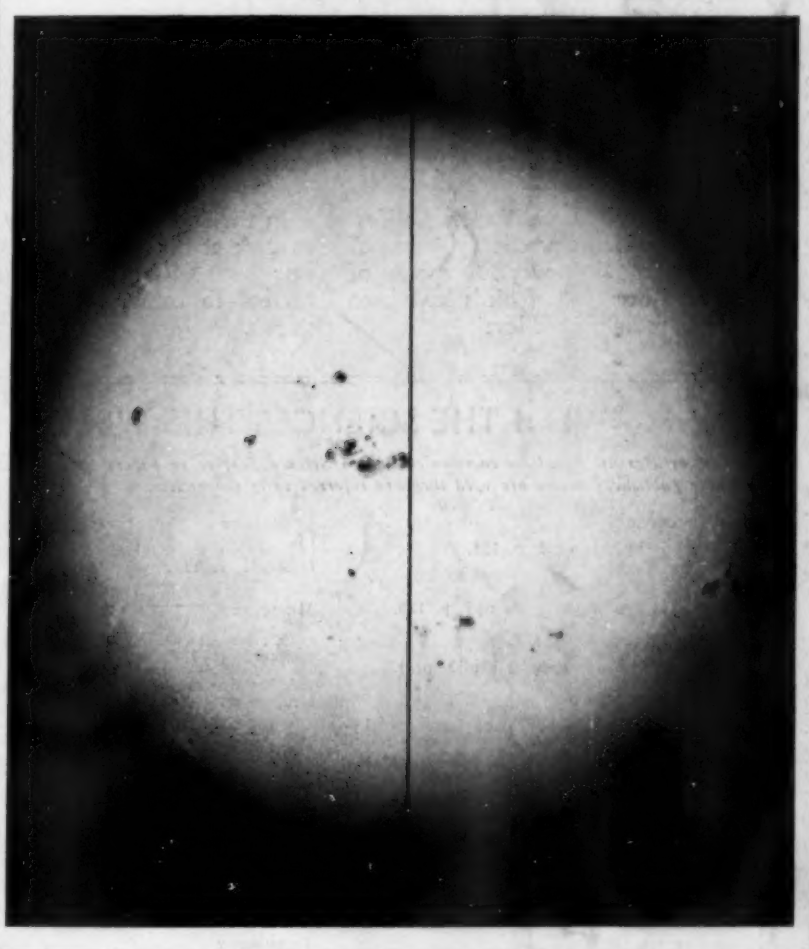
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



FEBRUARY 20, 1937

Turbulence

See Page 117

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Edited by WATSON DAVIS

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DO YOU KNOW?

People in the United States are eating more citrus fruit than they did ten years ago, but not so many apples, grapes, or bananas.

Why vegetables grow well in California is being investigated by a visiting British agriculturist, who reports that Britons are eating more and more vegetables.

Some dairymen paint dairy barn walls with aluminum paint to repel house flies, but recent experiments indicate that this has no particularly repelling value.

Gay Indian designs on rubber mats at entrances to the new Interior Department Building in Washington are the work of Indian art students at various schools.

Before 1891, Death Valley, California, was considered practically barren of life; but since then over 500 species of plants and over 100 of birds have been found there below sea level.

To travel the length of the North American desert is a 2,500 mile journey, from Washington State to Sonora, Mexico, and south to Puebla.

Due to modern interest in relationship of weather and air conditions to disease, the new Palace of Soviet Medicine in Moscow will have a large experimental meteorological station.

George Washington knew the farming problem of gullying soil and erosion, and he used such methods as he could to check erosion on his Virginia estate.

Yellowstone Lake is so large that its water follows the curvature of the earth and is 57 feet above a straight line projected from one beach to the other.

In the seventeenth century Paris was so dark at night that there was a regular business of renting lanterns and bearers to conduct people about the streets.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

AGRICULTURE

What is hydroponics? p. 121.

ANATOMY

At what age do you grow up? p. 120.

ANTHROPOLOGY

How old is the Steinheim skull? p. 127.

ARCHAEOLOGY

Did Aksum, Ethiopia, once have its sky-scrapers? p. 121.

How many books did the ancient Mayas leave behind? p. 118.

ASTRONOMY

Do sunspots accompany a solar eclipse? p. 118.

How large are the spots that have been appearing on the sun? p. 117.

Where was the Daniel comet? p. 121.

BIOPHYSICS

How does the ultracentrifuge aid in the study of viruses? p. 120.

CHEMISTRY

Can vapors be turned into solid wealth? p. 125.

Does wood hold another source of wealth besides cellulose? p. 122.

ENGINEERING-ENTOMOLOGY

What are ant hills good for? p. 121.

GENERAL SCIENCE

How is a 70-year retirement law affecting French science? p. 121.

GEOGRAPHY

How has the explorer Prof. Schmidt been honored? p. 117.

MEDICINE

Can one disease be used to protect against another? p. 120.

What dye means life to those infected with streptococci? p. 115.

What new remedy has been found for pyorrhea? p. 120.

METEOROLOGY

How heavy were the January rains? p. 127.

ORNITHOLOGY

What use have birds' wings besides in flying? p. 120.

PHENOLOGY

Are plants indiscreet about opening their buds? p. 127.

PLANT PHYSIOLOGY

Does a plant need its vitamin, too? p. 121.

PUBLIC HEALTH

Why must trainloads of food be destroyed in the flood area? p. 124.

VITAL STATISTICS

How long do Supreme Court justices live on the average? p. 116.

MEDICINE

Childbirth and War Are Now Robbed of Gravest Danger

New Chemical Saves 17 Out of 20 Mothers Infected With Childbed Fever—Wound Infections Fought

CHILDBIRTH robbed of its gravest danger for mothers. Maternal deaths from the most dangerous form of dreaded puerperal fever prevented in 17 out of 20 cases.

Medical science is on the brink of these great life-saving achievements if present hopes are justified.

Four out of five mothers who now die of "childbed fever" are saved by a new treatment used at Queen Charlotte's Hospital, London. There about half the puerperal fever cases in the English metropolis are treated. Dr. Leonard Colebrook, director of the Bernhard Baron Memorial Laboratories at the hospital, is now visiting in this country and relating the results obtained with the new treatment to American physicians and medical scientists.

This latest medical conquest recalls the dark days before the germ theory of disease was established when motherhood was so often a death sentence. Then Oliver Wendell Holmes and Ignaz Philipp Semmelweis demonstrated that the infection of childbed fever came from the dirty instruments and hands of the doctors and nurses. Antiseptics, and later asepsis, killed these germs. Now the work accomplished by Dr. Colebrook and his colleagues at Queen Charlotte's Hospital makes bringing children into the world even safer.

Credits Germans

Dr. Colebrook, however, modestly insists that he is "not the hero" of the story. That glory belongs, he says, to two German chemists, Mietzch and Klarer, who first prepared a certain red dye, and to Dr. G. Domagk, also a German, who first showed that this dye was able to protect mice infected with the deadly streptococcus of puerperal fever and other serious human ailments.

Prontosil is the name of the dye that seems destined for a high and shining place in medical science. The saving of maternal life, important as that is, is only part of the achievement expected of Prontosil. This red dye may give physicians the long-sought "ideal internal antiseptic"—the chemical that can kill disease germs in the body without injuring body tissues. For while Prontosil itself only destroys certain members of one family of germs, Dr. Colebrook hopes that chemists and biologists will learn from the action of this dye how to make other chemicals that will prove certain and safe cures for other human ills due to micro-organisms.

Go Slow

Dr. Colebrook emphasized this point at a meeting of the Washington Branch of the Society of American Bateriologists. He urged practicing physicians to go slowly in their use of the new treatment. At this stage, he explained, it is more important to learn how the chemical acts, and how it may be made even more effective, than it is to build up a record of enormous numbers of patients cured by Prontosil.

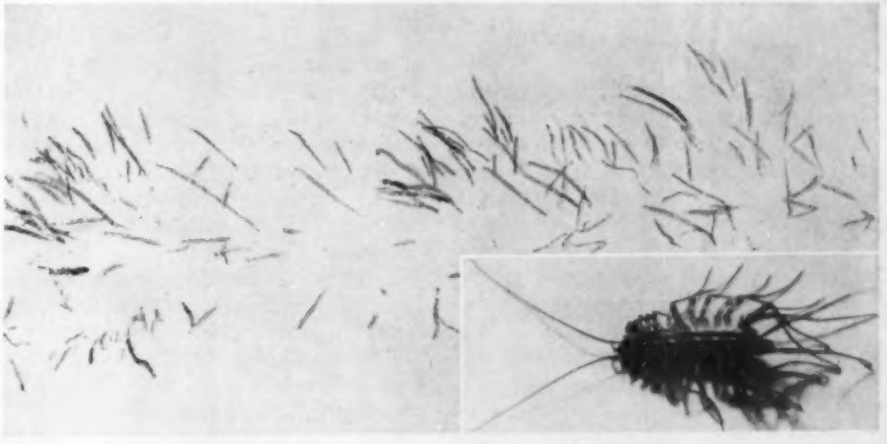
Puerperal fever, dreaded childbirth complication, is only one of the diseases caused by streptococci. Erysipelas, scarlet fever, septic sore throat and septicaemia, commonly called blood-poisoning, are others. For all of these Prontosil is possibly the long-sought cure.

Puerperal fever, however, is the particular infection that Dr. Colebrook and associates at Queen Charlotte's Hospital have studied. This condition is due to infection. Other germs besides streptococci may cause the condition, but fully one-half the cases, and those the ones most often ending in death, are due to infection with a particular streptococcus identified by scientists as Beta hemolytic streptococcus.

Heavy Toll

This deadly disease germ, a tiny, round organism, takes the lives of 1,200 mothers in childbirth every year in England and Wales, approximately 4,000 in the United States, and inflicts serious illness and suffering on five times that number of mothers, too often at the birth of their first child.

For five years before the discovery of Prontosil, Dr. Colebrook and colleagues at Queen Charlotte's Hospital had been studying this deadly puerperal fever. They have learned much that may help to prevent the condition, though that is part of another story, but they learned of no way that would prevent the deaths of mothers who became infected. Not all mothers with this condition die, but no treatment so far can be credited surely with saving the lives of any who recover.



CENTIPEDE WRITES SEISMOGRAM

The Fly, in the fable, clung to the spoke of the chariot-wheel, saying, "See what a dust I raise!" A similar parable might be told of the centipede called George, who is official mascot in the private seismological observatory of Mrs. M. M. Seeburger of Des Moines. George wandered across a freshly prepared sheet of seismograph record paper, leaving a trail of scrambled footprints more portentous-looking than the record of a mighty earthquake that ruins great cities. George emerged from hibernation a short time ago; by this token, says Mrs. Seeburger, she knows that spring is at hand.

The average deathrate every year for five years at Queen Charlotte's Hospital for puerperal fever patients infected with hemolytic streptococci was 22.8 per cent, Dr. Colebrook reports. During the sixth year, when Prontosil treatment was given to all patients so infected except a few who were not very sick, the deathrate was 4.7 per cent. Very nearly four out of five previously doomed mothers were saved. Careful study of the records and of the patients at Queen Charlotte's Hospital and of the records at other large maternity hospitals in London has convinced Dr. Colebrook that Prontosil was almost certainly responsible for this remarkable improvement.

The chemical, which looks like nothing so much as red ink, is now being widely used in this country and abroad for puerperal fever and many other conditions due to infection with hemolytic streptococci. Dr. Colebrook hopes that properly controlled tests will be devised and used in the United States to confirm the results obtained in London.

Latest development in the treatment is the discovery by French scientists of another chemical which is not a dye and which is as effective as Prontosil, in controlling infection in mice. This chemical is p-amino-benzene-sulfanamide, called sulfanilamide for short. It is now being tested at Queen Charlotte's Hospital. It has the important advantage of being much less expensive than Prontosil. The dye, Prontosil, is a patented product of the German dye industry, whereas sulfanilamide is a chemical that cannot be patented.

More important even than the saving of lives in childbirth and surgical infections promised by Prontosil is the possibility of its value in war. Stating that he hated war as much as anyone, Dr. Colebrook pointed out to his medical audience that war seems now so imminent that medical men must be prepared for it. Prontosil, or sulfanilamide, will be part of the future war surgeon's supplies, for streptococcus infections are perhaps the greatest danger he must fight.

"The appalling price we had to pay for streptococcus infections" during the World War was recalled by Dr. Colebrook in his address before the bacteriologists in Washington. This war-time experience, he said, was responsible for his present interest in streptococcus infections in childbirth.

Science News Letter, February 20, 1937

VITAL STATISTICS

Two Causes for Greater Age of Supreme Court Justices Today

TWO FACTORS have contributed to the fact that the U. S. Supreme Court today is made up largely of older men. One is the fact that the average age of justices at the time of appointment has been considerably older since 1862 than before that date. The other is that the average expectation of life for all men in the United States has increased materially as a result of improved public health and medical practice.

Expectancy of life at birth in the early years of the nation's and the Court's existence was between 25 and 30 years. Around 1850 men born in the United States had a life expectancy of 38.3 years. By 1910 life expectancy at birth for men had risen to 50 years and in 1930 it was about 60 years. These figures represent the average expectation at birth, but persons with better than average health may expect to live 70, 80 or even 90 years.

Justices of the U. S. Supreme Court are not an unusually long-lived body of men, statistical analysis shows.

As a group, each of the 66 justices appointed since the Court has been in existence lived about a year longer than would be expected for men of their ages in the ordinary walks of life, statisticians of the Metropolitan Life Insurance Company have figured.

Since 1862 the average age of the justices at appointment has been considerably greater than before that date, the figures also show. The situation has been reversed in so far as Presidents are concerned, it is pointed out.

The greater average age at appointment of the Supreme Court Justices may be due to the fact that the rapidly growing complexity of our legal structure demands men of riper age. Whatever the reason, the average greater age of these appointees during the period since 1862 "seems not to have affected their ability to carry on, if we may be guided by their greater longevity as compared with that of judges appointed in prior years. The average age of these later justices was almost four and one-half years greater than that of the earlier group—73.7 years as against 69.3," the life insurance company statisticians state in their report.

"During the 146 years that the United States Supreme Court has been in existence, 76 appointments and 2 reappointments—John Rutledge and Charles E. Hughes—have been made to this distinguished body. Of these 76 men, 66 are dead, their average age at death being 71.4 years. This cannot be called a particularly advanced age despite the fact that there have been three nonagenarians and nine octogenarians on the Supreme Court Bench since its foundation. As nearly as can be computed, the aggregate years of life expectation of these 66 men at the time of their appointment was 1,205, while the total number of years actually lived was 1,265. As a group, each lived about one year over the life expectancy of men of their ages in ordinary walks of life.

"Prior to the Civil War the picture was somewhat different from that following it. The total years of life expectation of the justices appointed during the earlier period numbered 712, while their actual years of life totalled 713. They thus fulfilled almost exactly the term of life that ordinary men of their age might expect. Subsequent to the Civil War, the number of years lived by the judges somewhat exceeded the expectation of life at time of appointment (522 years as against 493), namely, by not quite 2 years each over the expected. It can hardly be said, therefore, that life on the Supreme Court Bench is outstandingly conducive to longevity, as is generally supposed."

Science News Letter, February 20, 1937

SAFETY ENGINEERING

Mine Fatalities Cut During Past 3 Years

THE record of mine fatalities in the last three years, in the United States, is the best in the history of the mining industry, reports the U. S. Bureau of Mines. Due to increasing study of the causes of mine explosions the number of yearly deaths has been cut to an average of 40 a year from the average of 542 deaths yearly prior to the founding of the Bureau of Mines in 1910.

Science News Letter, February 20, 1937

PHYSIOLOGY

Heads and Tails Determined By Electrical Polarity

Orientation of Organs in Animals Depends on Way Chains of Molecules Are Marshalled by Charges

HEADS and tails in the animal world, and all the complex structures in between those opposite bodily poles, may possibly be due to the polarity, or heads-and-tails configuration, of the protein molecules that are the ultimate building-blocks of living matter.

This bold simplification of the problem of polarity in living organisms is offered by Prof. Ross G. Harrison of Yale University. Prof. Harrison was led to the formulation of this theory by the phenomena which he has observed through many years of experimentation on very early embryo stages of spotted salamanders. Salamanders are little amphibian animals shaped like lizards, but really closer relatives of frogs and toads.

The developing animal egg may seem on casual examination to have no head or tail to it, but long before such organs are externally visible the egg itself develops a decided top-and-bottom internal arrangement, with definite signs of right-and-left orientation as well. "Head" end is chemically different from the "tail" end, and there is a chemical and electrical gradient ranging through the space between them.

Prof. Harrison sees a theoretical picture of the protein molecules, which are known to be long, string-like affairs, and chemically different at their opposite ends, arranging themselves in parallel formation like soldiers in a regiment, so that the effects of their individual polarities become added together, to produce the greater polarity of the organism.

Lateral Organs

Prof. Harrison's theoretical picture goes on to include the development of the differences necessary for the production of lateral organs, by postulating the tacking of other blocks onto the sides of the long, parallel-arranged chains of the protein molecules.

The researches that resulted in this new effort to find a solution for the old riddle of organismal polarity were carried out principally on transplantations of the inner ear, in Prof. Harrison's little animals. At very early stages in development, when the whole creature was still less than a tenth of an inch long, the scientist patiently clipped off the tiny spot that was destined to become the ear, and transplanted it either to other animals of the same kind, or back on the original owner's head, though sometimes on the opposite side.

In general, he found that at early stages the organism as a whole was boss: Ear material developed into normal ears, no matter how he set it back on the operated spot. Even other skin material would develop into ears. But at later developmental stages, the ear material had grown to a position where it had "a will of its own," and would grow into abnormal ears, backward, upside down, or doubled, depending on how the transplant was set.

Science News Letter, February 20, 1937

GEOGRAPHY

Arctic Voyager Honored By the Explorers Club

PROF. Otto Yulievich Schmidt, Soviet Arctic explorer and virtual director of an area of the earth equal to two-thirds the size of the United States, has been granted the rare distinction of honorary membership in the Explorers Club. Such membership is limited to 20 men and only the recent death of General Greely opened the vacancy which Professor Schmidt now fills.

The citation read in part: ". . . for his outstanding personal achievements in the field of northern exploration and in recognition of the work of the group of able and courageous scientists whom he has led or directed in the field of Arctic exploration. . . ."

Leading expeditions since 1929 which opened the sea route over the top of Siberia to the East and colonization of the area has been the specific accomplishment of Professor Schmidt.

He has control of land and islands north of the 62d parallel with an area of 5,500,000 square kilometers. His position is somewhat like the job of being governor of Alaska with a touch of Secretary of the Interior thrown in.

PROF. OTTO Y. SCHMIDT

Last year 14 ships made the complete voyage from the Atlantic to the Pacific Ocean via the Northern Sea route. Altogether there are 160 ships employed north of Siberia, carrying 271,000 tons. Airplanes under Professor Schmidt's control did 17,000 hours of flying in 1936 and carried 5,400 passengers. His administration has built schools, established sawmills, prospected for minerals, developed mines and performed other duties in the territory.

Science News Letter, February 20, 1937

ASTRONOMY

Giant Spots Visible Now On the Face of the Sun

See Front Cover

CLOUDY weather during January has hampered astronomical observations, including those of the sun, but during the month it seems to have had an unusually large number of spots. A picture, taken on Jan. 31 by I. M. Levitt, with the 40-foot focus solar camera of the Cook Observatory, shows more spots than have been seen in more than seven years. This picture appears on the front cover of this week's SCIENCE NEWS LETTER. The large group, near the center, is about 90,000 miles in length and big enough to be visible to the unaided eye, when properly protected with smoked glass. It is so vast that 121 worlds like the earth could be dropped into it side by

side and have a bit of room left over.

The spots are huge tornadoes in the sun's atmosphere. Actually they are brighter and hotter than an electric arc, but appear dark by contrast with the hotter and brighter surrounding regions. (The vertical line is a plumb line photographed on the plate to help orient it.)

Science News Letter, February 20, 1937

ASTRONOMY

Great Solar Activity Taxes Code for Reports

SO NUMEROUS have sunspots become in the latest bursts of solar activity that the scientists' own radio code, by which far-flung observatories throughout the world communicate with one another, has become ineffectual.

The code of the International Scientific Radio Union, whose code name is URSI and whose messages are called ursigrams, has space for telling the number of sunspots up to 99. Seldom is this number exceeded in any day's observation. But in recent weeks, however, messages have been coming through marked 40 add 100 or 20 add 200, as examples, which mean 140 spots and 220 spots respectively. Peak number was on February 1, when 370 sunspots were observed.

Science News Letter, February 20, 1937

ASTRONOMY

Sun's Surface Is Stormy At Times of Total Eclipse

GREAT storms sweep the sun's surface at the time of a total eclipse, declared Dr. S. A. Mitchell, director of the Leander McCormick Observatory of the University of Virginia, in a lecture given under the auspices of the Smithsonian Institution.

Evidences of extreme solar activity have been obtained from photographs made during recent total eclipses, especially as shown by the coronal streamers and the lower but more intense flaming outbursts known as prominences. A comparison of all these photographs, said Dr. Mitchell, shows that the great activity of the sun was found not only at eclipse time but persisted throughout the whole period of four days covered by the plates.

Despite all the study that has been lavished on the corona, the great extension of pearly light around the sun visible only during a total eclipse, scientists are still in considerable doubt as to its real nature. That its great domes and streamers are in some way linked with the flaming prominences of the sun's body itself was suggested long ago, but the nature of the connection is still obscure. Photographs taken during one recent eclipse "demonstrate the fact that the longest coronal streamers, on which the shape of the corona more or less depends, are always located near prominences but are not necessarily exactly connected with the prominences which at the time of the eclipse are of the greatest height."

Astronomers' inability to answer all questions about solar phenomena observable during an eclipse should not be held too hard against them, Dr. Mitchell indicated. If there were now living any one astronomer old enough to have started his work in 1842, when really scientific eclipse observations began, and if he had "taken in" all total eclipses since that date, with the average amount of bad luck with the weather, he would in that near-century have had only about one hour's observation-time of the totally eclipsed sun.

Typical of the sun's unsolved mysteries on which data obtained with total eclipse observations provide only the merest hint, is the nature of the dark lines which appear in the spectrum of the light from the outer corona. Whether such observed dark lines really are coronal in origin or whether they are produced by the scattering of sunlight in the earth's atmosphere is still uncertain. Probably they originate, indeed, in the corona but the present evidence is not wholly conclusive, said Dr. Mitchell.

Science News Letter, February 20, 1937

ARCHAEOLOGY

Connecticut Yankee Steps Into Ancient Literary World

Young Scholar Learns To Read Rare Mayan Works That Escaped the Flames of the Spanish Conquerors

A CONNECTICUT Yankee is stepping across the centuries, not into King Arthur's court but into the literary world of the Mayan civilization.

He is having the thrill of reading slowly—but very surely, as he believes—words in Mayan books that were last read and understood by Mayan Indian scholars in their temple libraries in Yucatan, centuries ago.

For one thing, he has learned to tell the words from the pictures, and that is no simple thing in a kind of writing that has often been called picture writing. On the brightly colored pages of a Mayan book, it appears, you can find our own popular modern method of telling a story by pictures and captions.

At the annual meeting of the American Anthropological Association, this young man from Wethersfield, Conn., Benjamin Lee Whorf, surprised his fellow research workers by reading off sentences from two of the famous Mayan books. Various scholars have attempted to read these books. Mr. Whorf's interpretation of the ancient text is entirely different from anything that any one had heretofore found on the Mayan pages. To account for his reading, he carefully analyzed his method of deciphering no less than 41 Mayan words.

Study of ancient languages began as a hobby with Mr. Whorf, and he has gradually become more and more engrossed in America's own prize puzzle,

BENJAMIN LEE WHORF
He says: "Mayan writing is phonetic."

HOME OF LEARNING

In lofty temples like this, in the Mayan cities of Yucatan, America's earliest scholars wrote and read learned books. Out of the thousands of books these Indians treasured, only three have survived to offer twentieth century America a glimpse into an ancient literary world. This is an official copyrighted photograph of the National Geographic Society.

the writing system of the Mayan Indian civilization.

Backing enthusiasm with technical training, Mr. Whorf has plugged at university courses to learn how the Babylonians, and other ancient people, constructed their writing systems, and he is now working as an honorary fellow at Yale. One of his reports on the Mayan writings was published by Harvard University.

Only Three Books

The main goal is to read three Mayan books. There are no more. There are inscriptions in addition to date recordings on some of the stone monuments of the Mayas that archaeologists unearth in ruined cities in the American tropics. But the greatest interest attaches to the three Mayan books that escaped the flames when Spanish missionary zeal demanded that Mayan Indians make bonfires of all heathen works.

In one city alone, four thousand books of the Mayan literature were lost in these fires. When the crusade was over, the amazing erudition of a self-made American civilization was almost lost to history. In astronomy, calendar making, literature, these Indians could hold their own with any of the world's famous civilizations.

Three books, so far as any one knows, are the only exhibits from those libraries that escaped, and the three found their way to Paris, Dresden, and Madrid. The fate of Madrid's Mayan book, endangered by Spanish War, has not been learned. The book was separated in two parts, and treasured by two libraries in Madrid. It may have been removed from the city with numerous art works that have been saved. Facsimiles of the three Mayan books safeguard the contents for science, even though accident may befall the valuable originals.

It is not correct, says Mr. Whorf, to think of the Mayan Indians as drawing pictures for their writing system. They built their writing system on a much harder and more advanced principle. It was phonetic, with each sign standing for a sound or syllable.

Early Theory

Thus Mr. Whorf revives a very early theory about the Mayan writing. Yucatan's most famous colonial priest, the Spanish Bishop Landa, wrote down 27 characters of Mayan writing and explained that they represented sounds similar to those in the Roman alphabet. But when American scholars 50 years ago launched an intensive attack to explain the Mayan writing, they could not find that the bishop's Mayan alphabet was of any help. Their efforts failed. And so the phonetic theory of Mayan writing came to be mainly discounted.

Phonetic Writing

"The Mayan writing is phonetic," explained Mr. Whorf. "But Landa was wrong in thinking that 27 signs made a Mayan alphabet. In fact, there was no Mayan alphabet at all.

"The Mayas used several hundred signs in their writing. It was rather like the cuneiform writing of Babylonia in that respect.

"So far, I have deciphered enough signs to spell out about 100 written words in Mayan texts. Using these words I have read certain passages in the Mayan codices, as the books are called."

One significant fact about Mayan writing, which his studies bring out, is that the Mayas often had several ways of writing the same word. Just as today we write "through" or "thru" and recognize both as the same word, or just as we might conceivably write "coffee" or "kawphy" and read them both the same, so the Mayas often varied their spelling.

Word Spelt Two Ways

On a piece of paper Mr. Whorf quickly sketched two ways that a Mayan Indian could write the word "sit." It can be spelled, he explained, with different combinations of signs, and the result, to uninitiated eyes, gives very different appearances.

Complete deciphering of Mayan writing, Mr. Whorf maintains, means not merely recognizing what a sign means, but knowing how it sounded when a Mayan Indian read it aloud. In time, he believes, it will be possible to read the ancient books aloud. Living Mayan Indians, who have lost the literary and scientific heritage of their ancestors, still retain most of the speech forms, and can be of considerable help in fitting Mayan sounds to signs.

Some pages in the Mayan books are inscribed with chants or verses, and illustrated by series of pictures, Mr. Whorf says. The Indians repeated the chants in stanzas, like songs chanted by some Indian tribes in the United States today.

Mayan Song Described

From the Spanish-owned Mayan book, the Codex Tro-cortesianus, Mr. Whorf read this line: "God I our lord implants staff in ground." God I is just an alphabet (*Turn to page* 125)

MEDICINE

Powdered Bone Suggested As Remedy for Pyorrhea

BOILED powdered bone was suggested as a remedy in pyorrhea and diseased jaw bones at a faculty clinic at Columbia University School of Dental and Oral Surgery.

Powdered bone was successful in treating pyorrhea and jaw bone damage in dogs, Dr. Frank E. Beube reported.

"It seemed evident from the work on dogs that similar results could be hoped for by the use of the bone powder in lesions of the alveolar and maxillary bones of patients," Dr. Beube concluded.

The bone used in the experiments of Dr. Beube and Dr. Herbert F. Silvers was obtained from the long bones of sheep and cows. This boiled powdered bone was packed into the holes surgically produced in the jaw bone to resemble the holes produced by disease or injury. Within a few weeks new bone, natural cement layer, and other dental tissues had grown in to replace those lost. In the case of pyorrhea, a "quite loose" tooth was firm in its socket after the powdered bone treatment had healed the diseased condition.

Science News Letter, February 20, 1937

ANATOMY

You're Not Grown Up at 24 —Or Even Perhaps at 40

YOU are not grown up at 24. You may not even be grown up at 40. You may increase in height more than a third of an inch after you are an adult, and supposedly "finished."

This is the latest evidence on continued growth in men and women, reported by Dr. Ales Hrdlicka, anthropologist of the U.S. National Museum.

Citing as authority thousands of measurements that he and other scientists have made on white Americans, Indians, and others, Dr. Hrdlicka presents new facts, some of which upset old and universal notions about the human body:

A man has generally been considered fully mature at 24. On the contrary, legs and trunk keep growing slightly far into adult life, and this is apparently true in men of all races.

In women—of the Pueblo Indian tribe, at least—the trunk grows slightly faster than the legs.

Arm length appears to increase slightly in adult life.

Hands and feet tend to become larger, and may even grow more than the body as a whole. Close-fitting shoes worn by the white man and white woman make it hard to study in them normal foot changes. In Indians, however, Dr. Hrdlicka learned that women's feet grow more than men's.

A "grown" person's chest continues to broaden slightly until 40 to 50 years, that is, if the individual is an Indian. In whites, the chest growth continues even later in life.

As old age sets in, the chest decreases in breadth. The trunk, in either sex, shrinks faster than leg length.

A possibility that medicine may find this new knowledge of adult growth valuable is suggested by Dr. Hrdlicka. When normal growth changes are definitely determined for the various parts of the body, it may be possible to recognize variations from normal as pointing to constitutional defects.

Science News Letter, February 20, 1937

BIOPHYSICS

Virus Molecules Isolated By Ultracentrifuge

DIFFERENCES between the filter-passing viruses that cause diseases show up when they are whirled in the ultracentrifuge, a machine that can subject materials placed in it to pulls and stresses many thousands of times as great as the force of gravity.

Marked differences between the virus of ring spot, a disease of tobacco plants, and the more familiar tobacco mosaic, were shown when plant juice containing the ring spot virus was subjected to utracentrifuging equivalent to 60,000 times gravity, Drs. W. M. Stanley and Ralph W. G. Wyckoff of the Rockefeller Institute for Medical Research state (*Science*, Feb. 12).

Tiny pellets of material found after repeated centrifuging contained the disease-transmitting crystalline virus proteins in much higher concentration than in the original solution.

This particular virus was very hard to work with because of its instability, Drs. Stanley and Wyckoff state. It broke down chemically and lost its disease-causing power at ordinary room temperatures, and could not stand a very slight degree of acidity.

The two researchers also subjected several other kinds of disease viruses to ultracentrifuge treatment, and found that each kind had its own characteristic way of responding.

Science News Letter, February 20, 1937

IN SCIE

MEDICINE

Distemper Protects Monkeys Against Poliomyelitis

USING the germ or virus of a mild disease to protect against attacks of another more serious disease virus may be the method of the future for protecting against such intractable ailments as infantile paralysis.

This possibility appears in a report of Drs. Gilbert Dalldorf, Margaret Douglass and H. E. Robinson, of Grasslands Hospital laboratories, Valhalla, N. Y. (*Science*, Feb. 12).

The virus of dog distemper, these scientists found, protects monkeys against infantile paralysis. In the Grasslands laboratories, the infantile paralysis death-rate for monkeys is 100 per cent. Ordinarily all the monkeys die of the disease. When monkeys suffering from distemper, as a result of infection with dog distemper virus, were infected with infantile paralysis virus, only one-third of the animals died. Of the two-thirds that recovered, half had no paralysis when they got well. Even in those animals that died the paralysis set in later than in the controls.

These results show that a relatively mild disease can to a certain extent protect against an invariably fatal one. The studies also suggest, the scientists point out, the existence of a new immunity or protective mechanism in the virus field, which at present is one of the most baffling in medicine.

Science News Letter, February 20, 1937

ORNITHOLOGY

Wings Are Handy For More Than Flying

A BIRD'S wings are not just for flapping and flying. Among uses some birds find for their wings, J. W. Sugden, University of Utah, cites these: balancing, display or drumming in courtship, to shelter young, as striking weapons, for aid in climbing, to stir up fish, and to support the body in place of the feet as a substitute for perching.

Science News Letter, February 20, 1937

E FIELDS

PLANT PHYSIOLOGY

Vitamin B_1 Found Necessary For Growth of Plant Roots

VITAMIN B_1, the food factor that prevents the Oriental nervous disease called beri-beri, has been found necessary also for growth of plant roots by Dr. James Bonner of the California Institute of Technology. (*Science*, Feb. 12.)

Dr. Bonner, growing bits of amputated pea roots in a culture fluid containing essential mineral salts and sugar, found that new growth would not occur unless he added an extract of yeast.

One of the things in yeast extract is vitamin B_1, so he tried a purified crystalline form of that. With very minute quantities of the vitamin he was able to obtain even better growth of his roots than he got with the extract. The conclusion therefore is that vitamin B_1 is as necessary for plant growth as it is for the health of animals.

Science News Letter, February 20, 1937

GENERAL SCIENCE

New French Law Hits Elder Scientists

AIMED at opening careers for young intellectuals is the new law recently promulgated in Paris which makes obligatory the retirement of state employees, including professors, at age 65. What the law will do to the nation's scientific march of progress is a matter of serious consideration, for many of the men affected by the law are leaders in their fields.

The roll of men who must resign from public activity this year includes many scientists from the Institut de France, even though Institut members are permitted to work until 70 years of age under the law. Fifty per cent of these scientists are affected by the legislation, a survey shows.

In the field of physical sciences there are: Edouard Branley, Arsene d'Arsonval and Andre Blondel. In pure and applied chemistry, Augustin Behal, Alexander Desgrez, Paul Sabatier, Georges Charpy and Louis Lumiere. Geologists include Henri Douville, Lucien Cayeux and Louis de Launay. Botanists and zoologists include Pierre Dangeard, Marin Molliard, Emile Schribaux, Paul Marchal, Charles Gravier, and Lucien Cuenot. Mathematics and astronomy lose Emile Picard and Henri Deslanders. Also lost will be the pathologist Emmanuel Leclainche, mineralogist Alfred Lacroix, naval engineer Maxime Laubeuf and Charles Lallemand, inventor of the automatic sea level recorder.

Science News Letter, February 20, 1937

AGRICULTURE

"Dirtless Farming" Now Named "Hydroponics"

MEET HYDROPONICS, a new word in the world of science. It is applied for the first time in an article in *Science* (Feb. 12), to mean the raising of vegetables, flowers, and fruit without soil, in tanks of warmed, fertilized water. The new name is proposed by the originator of this system, hitherto known by the colloquial nickname of "dirtless farming," Prof. W. F. Gericke of the University of California.

Prof. Gericke originally suggested calling his method "aquiculture," by analogy with "agriculture." But "aquiculture" was already in use to designate the economic utilization of natural bodies of water, such as oyster beds and fishponds. A colleague of Prof. Gericke, Prof. William A. Setchell of the botany department of the University, suggested the new name and Prof. Gericke adopted it.

"Hydro" in Greek means water and "ponics" comes from the Greek word for labor; hence water-labor or water-work becomes "hydroponics."

Science News Letter, February 20, 1937

ENGINEERING-ENTOMOLOGY

Ants Contribute Material For Use on Road Surface

ON THE French African motor road, one of the longest in the world, the ingenuity of construction engineers is being combined with the industrious nature of the ant. Ant hills ten feet high, scattered freely through that region, contain a hard gritty material which makes an excellent road surface. Only a part of each hill is dug away for the road, experience having shown that the ants will then quickly replace the used material.

Science News Letter, February 20, 1937

ASTRONOMY

New Comet Observed By Japanese Astronomer

LOW in the western sky, a bit toward the north, a new comet has just been discovered by the Japanese astronomer Simizu, according to word received by Science Service from Harvard College Observatory. Of the 13th magnitude, it is so faint that only sizable telescopes will reveal it and it is not visible to the unaided eye. The comet is believed to be the well-known Daniel comet making a return trip to the vicinity of the sun and earth where the sunlight reflected from its body makes it observable.

The comet is reported to be a diffuse object and no comment on its tail has been received. Its position on Feb. 11 was given as right ascension 2 hours 44 minutes and 5 seconds and declination as plus 22 degrees 27 minutes, which places it west of the constellation Andromeda and near Aries and Triangulum. When seen in 1909 the Daniel comet was visible from Dec. 6 to April 11. Based on observation at that time its period of motion about the sun in an elongated ellipse was estimated at about $6\frac{1}{2}$ years.

Science News Letter, February 20, 1937

ARCHAEOLOGY

Ethiopians' Holy City Had Skyscrapers

ETHIOPIANS built skyscrapers, not for office buildings but for palaces, in their holy city of Aksum, is the belief of Prof. Daniel Krencker of the University of Berlin.

He finds evidence of this by studying six curious stone monuments that have stood in a cemetery of Aksum for over 1,400 years, and that resemble skyscrapers. Tallest of these graveyard skyscrapers, now fallen, stood 109 feet high. Each monument is carved out of a single stone block to resemble a narrow, towering building, with sham doors and windows. Thirteen stories are indicated on the tallest monument.

Comparing these monuments with ruins of ancient palaces in Aksum, Prof. Krencker reports that the palace ground plans resemble the plan of the imitation buildings in the cemetery. Similarities lead him to believe that the ancient holy city of Ethiopia was dominated by tall buildings, which the graveyard stones show in exaggerated narrow form.

Science News Letter, February 20, 1937

CHEMISTRY

From Waste to Wealth

Lignin, Now Mostly Just a Stream-Polluting Nuisance, Shows Promise of Becoming Useful Chemical Citizen

By DR. FRANK THONE

CELLULOSE is a word that has escaped from the cage of technical jargon where scientists once kept it and has become everybody's pet. We all know cellulose now. It is the white shiny stuff in plants that expresses itself in a thousand forms—as cotton and linen and hemp and ramie, as cornstalk pith and thistledown and the walls of cells we peer at through the microscope. We meet it everywhere in articles of daily use. Cellulose shirts and sheets woven out of natural fibers, cellulose paper for reading and writing, cellulose compounded into the thousandfold synthetic things from rayon to artificial leather, into suggestively trade-named substances like Cellophane and Celluloid. We even blow each other to bits with the aid of cellulose, for guncotton is trinitro-cellulose. We might almost call our modern era the Cellulose Age.

Close Partners

Now cellulose, the versatile, the agile, the clever, the Jack of all trades (and master of them, too!) has a chemical brother. Lignin is his name. In nature, lignin and cellulose are almost inseparable, and they work well together. Cellulose forms the cell walls, the fibers, the structural elements generally, and lignin cements them powerfully together. This cellulose-lignin partnership expresses itself most strikingly in wood. Monumental trees, cable-like vines, lowly shrubs, are all products of their joint labors.

Lignin gets its very name from its importance in wood formation: the Latin for wood is *lignum*. We get a derivative in lignite, the fibrous, semi-woody brown coal used to some extent in this country and very widely in Europe. And we get the word straight, in lignum-vitae, an extremely heavy tropical wood highly valued for its hardness and durability.

Chemically Shy

But although these two chemical brothers, cellulose and lignin, are thus almost inseparable as they occur in nature, they are in many ways as different from each other as human brothers often are. Cellulose has proved able to go out into the world and make fame and fortune for himself: as already mentioned, he is in all kinds of businesses, from paper to paint, from explosives to the dainty things on milady's boudoir table. It is not easy to separate cellulose from his brother lignin, but chemists have succeeded in doing so, and have found a multitude of jobs for cellulose.

Lignin, on the other hand, has persistently stuck in the army of the unemployed. Whether he was chemically sulky or merely shy, at any rate he refused to let the scientists know much about his character or capabilities. To speak less figuratively, even yet chemists do not know the structure of the lignin molecule, though they have been trying to find it out for nearly a hundred years. You cannot do much with a chemical compound until you know how it is put together.

However, very recently chemists at the U.S. Forest Products Laboratory in Madison, Wis., have broken down a little of lignin's chemical secretiveness, and with even this partial knowledge in hand they have been able to put him to work at last. Lignin's new job is in one of the occupations his brother cellulose has followed successfully for many years—plastics.

How important it is for American industry, that a job has at last been found for lignin, has been well summed up by Carlile P. Winslow of the U.S. Forest Service, who directs the work of the Forest Products Laboratory. Says Mr. Winslow:

"Lignin makes up twenty to thirty per cent of the weight of the average plant stem. Billions of tons of it are present in the world at any one time, and the supply renews itself indefinitely by natural growth.

Waste and Pollution

"Limiting our view to present facts in the United States, we find the lignin problem pressing for attention in two forms: a million tons of it are dumped into our streams annually as waste liquor from pulping mills; in the background, fifteen million tons more, contained in four times that tonnage of waste wood.

"The question that faces the chemist and the inventor is, how can we change

MAKING LIGNIN USEFUL

The first step in the process (left): pouring sawdust into the digester. After digestion in the heavy kettle the sawdust emerges in the form of "hydrolized" wood. Then the powdery dough-like substance is put into powerful presses to be shaped into solid forms.

PRODUCING BEAUTY

Out of the press comes a hard disk ready to be machined. It can be turned on a lathe (center) like metal or wood. At the right are shown stock shapes of lignin plastic and, in front, a molded ash tray.

lignin from a source of stream pollution and a waste to a source of wealth and usefulness?"

Mr. Winslow and his fellow workers at Madison have found a large part of the answer to his own question, in qualifying lignin for the plastics job. There seems to be no limit to the world's demand for things that can be made out of those synthetic gummy stuffs that harden and polish and work up beautifully into everything from such trifles as ash trays and vanity cases and buttons to larger objects opening up possibilities of big quantity uses, like floor tiles, wall panels, auto instrument boards, electrical insulators, and acid-resisting containers for chemicals. Plastics, all the way from the old-fashioned hard rubber to the newer ones made of cellulose, phenol, formaldehyde, etc., are taking over hundreds of jobs that used to be given to wood, metal, pottery, glass, leather; sometimes because increasing scarcity has made the old things too expensive, but often too because the new synthetic stuffs can do the work better. So lignin plastics are entering a field that offers limitless possibilities which even its numerous predecessor plastics have not yet been able to exploit to the full.

Simple Now

Chemists had to put in many hours of hard brainwork before the rather simple-looking process for producing lignin plastics could be called a success. But the very fact that they made it simple, finally, is one factor that should make for its further success on a large commercial scale.

To prepare lignin for its job in the plastics business, sawdust is shoveled into a heavy iron kettle with a lid that can be clamped down tight, called a digester. Dilute acid is added, the lid is closed, and the digester is heated for a while. This raises steam and acid vapor inside, and changes the chemical nature of the sawdust—"hydrolizes" it, the chemist says.

When the digester is opened again, the sawdust as such is gone and in its place there is a dark powder swimming in a bath of dark syrup. The acid has changed part of the sawdust into a mixture of several different kinds of sugar—that accounts for the syrup. This has its own chemical possibilities, but for the moment it is the dark powder we are interested in. So the syrup is drained off, leaving us the powder.

Hard and Strong

This can be put by itself into moulds of suitable shape and subjected to the grip of powerful hydraulic presses. It comes out no longer a powder but as slabs, disks, other shapes, very dense, hard, strong, and black as ebony. By using dies of suitable shape, it can be formed directly into trays, knobs, handles, bowls—what you will. Or it can be pressed into flat "blanks" which can then be turned on a lathe, sawed, bored, otherwise machined, about as you would work hard rubber.

Thus far, it has not been possible to prepare the lignin plastic in the beautiful transparent and light-colored forms in which the phenol-formaldehyde and cellulose plastics can be had. This handicap, however, can be largely overcome by enameling, painting, lacquering and other surface treatments, for it accepts them all very well. An especially interesting facing can be given it by sifting powdered metal into the mould before the plastic-powder is filled in. The metal then becomes an integral part of the finished product.

The great advantage of the wood-waste moulding powder is its very low cost. Preliminary estimates by Mr. Winslow indicate that it can be made in bulk for two or three cents a pound. Other types of plastic materials cost very much more than that. It is not improbable that lignin plastics will take over much of the field now occupied by its predecessors, on price competition alone, and that it will also open up new fields of usefulness that the others can not enter now because of their too high cost.

One advantage lignin plastic shares with other materials in its class: it has high electrical resistivity, and so will make a good insulating material. It is also resistant to acid and its waterproof qualities are very good. It is a poor conductor of heat, so that it feels warm and comfortable to the touch—something like its parent substance, wood, in this respect. This quality should give it advantage in bidding for use as wall paneling and floor tile. The bathroom floor will seem much less chilly underfoot, when it has been done over in "Lignitile." (That isn't a trade name yet, but it probably will be some day—or something like it will be coined and boosted with all the arts of modern advertising.)

Add More Waste

The lignite-containing powder may be used just as it comes from the digester, but the chemists of the Forest Products Laboratory have found it advantageous to add from six to eight per cent each of aniline and furfural—both of these, incidentally, are valued industrial materials made from what once was troublesome waste: aniline from coal tar, furfural from oat hulls, corncobs, straw and other farm by-products. With these additions, the material works up better. It is less likely to stick to the hot metal of the mould, and can be

pressed and shaped at lower temperature.

Well, there stands lignin, taught by Uncle Sam's chemists and technicians how to do a big job in a big industrial field. His sleeves are rolled up and he is ready to go to work. It probably won't be long now until plastics manufacturers will be clamoring for his services.

Odd Jobs

As a matter of justice to lignin, he wasn't altogether a loafer before his present big chance came. He picked up what odd jobs he could get.

One has been holding down linoleum. Waste liquor from paper mills contains the lignin from the wood pulp, rudely torn away from Brother Cellulose by chemical means. Turned out of the factory as a bum, lignin long was an undesirable waterfront character, polluting rivers, destroying fish, and in general making a nuisance of himself. Then someone discovered that if you boiled most of the water out of the waste liquor, what was left made a good adhesive for sticking linoleum to floors. So there was at least a small job for lignin.

Lignin in the same waste liquor from pulping mills has been used to some extent on unpaved roads, to make the dirt stick together better and raise less dust. Odd job number two.

Soil Aid

Recently some rather promising experiments with lignin as a soil conditioner have been made. Lignin has little if any direct fertilizer value, but does help to make certain heavy soils lighter and more tillable, serving as a sort of artificial humus. With this lignin soil treatment, direct fertilization with nitrates is usually also added.

Nor are the chemists by any means through with their ambitions for this hitherto neglected brother of the wood family. As they overcome lignin's reticence and learn more about his inner nature, they can find new jobs for him. Some aptitudes in the direction of oxalic acid, a valuable bleaching agent, and possibly dyestuffs also, have been discovered. They'll make a useful citizen of lignin yet.

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Science News Letter, February 20, 1937

Steel varies in hardness from material hard enough to scratch glass to material soft enough to be scratched with a needle.

PUBLIC HEALTH

Flood Forces Destruction Of Vast Quantities of Food

"Tragic but Necessary" Condemnation of Trainloads Supervised by Men From Food and Drug Administration

AS FLOOD waters subside on the Ohio, the greatest destruction of foodstuffs and medicine in history is being carried out in all cities and towns in the inundated region. How much, it is uncertain as yet, but there is no doubt that the quantity condemned and destroyed after the 1936 flood, estimated at 50,000 tons, will be greatly exceeded —perhaps doubled or trebled.

The destruction of flood-damaged food and drugs is being carried out by a cooperative arrangement between Federal food and drug authorities and state, county, and municipal public health officers. The Food and Drug Administration of the U. S. Department of Agriculture has thirty inspectors in the field, and the various states concerned have supplied the services of sixty or seventy of their own men. Flood-spoiled commodities condemned by them are carted away and destroyed by workers of the W.P.A. and the C.C.C., and by volunteer labor of private trucking and merchandising firms.

The wholesale destruction of whole trainloads of food was described by George Larrick of the Food and Drug Administration as "tragic, but necessary." Whatever the polluted water touched it ruined, so far as possibility of safe human consumption is concerned. Even if it were thoroughly heat-sterilized, so that the danger of typhoid and dysentery were removed, there would still be so much filth in it that it could not with any decency be offered to even the neediest of flood refugees.

Individual items in the holocaust are shockingly impressive. In the Cincinnati yards the inspectors found 139 carloads of fresh fruits and vegetables that had been under water. With the exception of some cars of bananas and strawberries, all looked fair and appetizing. Yet the inspectors could not dare to release the contaminated food, and ordered it all destroyed.

In a Cincinnati warehouse there were 132 tons of coffee that the water had reached; in a Louisville dairy, 100,000 pounds of butter. All had to be destroyed.

Typically, the work was divided by assigning inspection of wholesale warehouses and railroad freight concentrations to the Federal officers, while municipal and county officers took over the retail establishments. First scouting trips of the inspectors were made in boats, while the water was still high in the streets. As the river went down, trucks and railroad cars were loaded with the commodities marked for destruction.

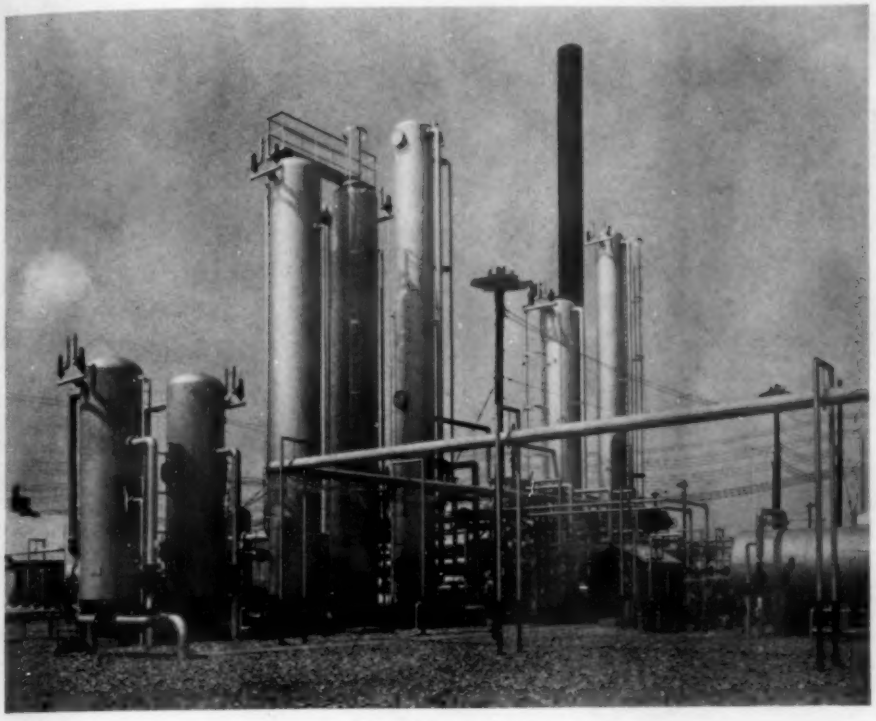
Disposal of the condemned goods was not easy. Most of the regular city dumps were flooded, and municipal incinerators are still out of commission. New dumping sites had to be selected, and wherever the damaged materials could be hauled by rail the railroad dumps were used. Glass containers were smashed, kerosene sprayed on such foodstuffs as flour and sugar to "denature" them, and wherever practicable the destroyed food and drugs were buried deep under the trainloads of mud and debris shoveled up out of the city streets.

Only two classes of packages were permitted to be salvaged: canned goods, and food and drug products hermetically sealed in glass. Screw-top glass jars could not qualify. The permissible salvaged cans and bottles were scraped clean of their labels, washed, chlorine-treated, and then passed for use. Many firms contributed large quantities of such salvaged foods for relief.

Whisky in Louisville's famous warehouses is probably safe, said Mr. Larrick; though inspectors, with the more important problems of food and drugs to deal with first, have not got round to that yet. Both bottles and barrels are well sealed, he explained, and if they are thoroughly washed and chlorinated outside the contents will doubtless be all right.

"Besides," he added, "any germ that might get through and tackle the contents would probably find straight Kentucky liquor a bit too strong for it."

Science News Letter, February 20, 1937



FOR SALVAGE

With silver towers aimed at the sky the new crude oil stabilization plant at Basile, La., enables oil men to salvage valuable gases from petroleum which formerly were lost. It is estimated that $100,000,000 annually could be saved by the nation-wide adoption of similar equipment.

CHEMISTRY

Lost Vapors Captured To Conserve Oil Resources

HARD-FISTED oil men looking for ways to earn more dollars and the more visionary people who rightly worry about the future oil and natural gas resources of the country can alike enjoy a new type of oil stabilization and gasoline recovery plant just opened at Basile, La.

Adoption of the equipment throughout the nation would result in $100,000,000 annual economies, it is estimated. And with a single further stage of equipment the plant will soon be ready to put back into the earth the vast wastage of gas and light volatile petroleum vapors which hitherto have been considered a regrettable but unavoidable loss whenever an oil well was drilled and opened up.

Millions of dollars in the petroleum industry, it is pointed out by oil men, change hands on the measurement, or gauging, of oil. Previously and still widely today this measurement is done at atmospheric pressure and continually the lighter, gaseous elements of crude petroleum evaporate into the air and are lost. Somebody, somewhere along the line from the well to the final purchaser, has to pay for this loss.

Equipment already installed automatically measures the gases and fluids which come off from the well, processes the volatile vapors and is recovering in the form of gasoline about 60 per cent of those petroleum products which formerly were lost in gauging in tanks at atmospheric pressure, either at the well or in transit.

Under the new arrangement the previous setup of separate tanks and separators at each well is now abandoned. Each production well has its contents piped to a central plant where, under pressure, the gas and oil content is measured. This metering system is the basis for royalty payments.

At the central plant, following measurement, the gas and oil are put into a common pipe system and kept under pressure until the lighter vapors are recovered from the crude oil. Analyses of the sample taken from the individual separators is checked against the output of this central recovery plant to provide an oil audit for the owners of each lease.

The crude oil, thus stabilized by the removal of its more volatile portions, is ready for shipment with little further evaporation loss. Previously such loss was estimated as 18 per cent of the gross production.

In areas where there is no market for natural gas recovered by the new process an additional apparatus can be attached and the gas piped back under pressure into its original "home" in the well. The plant is operated by the Continental Oil Company.

Science News Letter, February 20, 1937

From Page 119

letter name that a German scholar made up for this particular Mayan god. Mr. Whorf has not yet discovered how this god's name was pronounced in Mayan.

From the Mayan book in Dresden, Germany, he offered this sample of Mayan song: "The lightning monster with the vessel of the rain destroys."

Pictures beneath each line show the events told of, he explained, but the translation does not depend on the pictures, or appearance of the characters, but solely on the way the characters are put together, which is to spell the words of these Mayan sentences.

Beyond illustrative examples, this man who is ambitious to read the Mayan "classics" is not yet ready to read the Mayan books publicly.

"There is much work to be done," he says, "before the language can be regarded as fully understood. Hundreds of signs remain to be deciphered. And I feel the time has not come to tell more about the contents of the books as they are unfolding themselves."

Science News Letter, February 20, 1937

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CHEMISTRY

Farm Wastes May Put Money In Farmers' Pocketbooks

Cellulose for Varnish, Starch for Motor Fuel Among Many Savings Which Chemists Can Give Farmers

CHEMISTS will turn millions of tons of waste farm products into useful materials for industry that will put additional cash money into farmers' pocketbooks, Dr. Henry G. Knight, chief of the U. S. Department of Agriculture's Bureau of Chemistry and Soils, predicted to the Southern Chemurgic Conference, provided they are given the opportunity to conduct the necessary research.

Dr. Knight pointed to millions of dollars added to the agricultural income through science-taught utilization of lemon and orange culls, cotton seed, sweet potatoes and naval stores, such as rosin.

Hundred Million Tons

"The total production of cellulose on all the farms of the country amounts to something like 100 million tons a year," Dr. Knight explained. "Its utilization in the form of paper, building board, insulating material, and absorbent material, as well as its conversion into foods, drugs, paints, varnishes, lacquers, dyes, and cosmetics, is an inviting field of research that many chemists would like to explore if they had the money and time."

Every pound of grain means from 1 to 2½ pounds of stalks and husks as by-products, while cotton, rice, peanuts and syrup also means stalks, husks and hulls upon which farmers have expended soil fertility, labor and capital, he said. The old method of using stalks, hulls and culls for livestock feed and building up soil fertility does not provide a cash income for the farmer and for that reason processing of farm wastes into products of cash value is very desirable.

The hundred million tons of cellulose are only part of the chemical constituents of farm by-products. Southern stalks and hulls are about 40 per cent cellulose, 30 per cent lignin and 30 per cent semi-cellulose.

Use of starch as a fuel for running automobiles and other engines was hinted by Dr. Knight in discussing the U. S. Department of Agriculture's research which has made possible the conversion of sweet potatoes into a high grade starch for textile use. Germany has already demonstrated starch as auto fuel. Referring to recent estimates that the world's oil supply would probably be exhausted in another 20 years, Dr. Knight explained:

Plan for Future

"What seems impossible today often becomes a reality tomorrow, especially in times of war and other emergencies, and it is well for us to work out these chemical problems as we can and keep them on record for the future if they are not practical under existing conditions."

Commercial development of the new sweet potato starch industry is foreseen by Dr. Knight as the result of his bureau's pioneering at a small plant in south Mississippi. Of the 80 million bushels of sweet potatoes raised on one million acres in the South, a quarter are culls that could be made into textile starch to replace a product that is now imported. In addition there is a pulp by-product that the Mississippi Agricultural Station has found to be a valuable feed for beef cattle.

The conversion of cull citrus fruit from the liability that it was 30 years ago to a new source of millions of dollars income to growers in California, Florida and Texas is an outstanding example of the fruitfulness of the federal government's chemical research in agriculture. American production of citric acid from cull lemons and by fermentation has practically eliminated the necessity of imports of this chemical and has made us an exporter in the world market.

Other crops whose major and by-products can be made more valuable by research, Dr. Knight said, include: bagasse of sugarcane, cotton, rice, peanut hulls, soybeans, etc.

"Chemists must not raise false hopes among the millions of farmers who deserve more money than they are getting from the culls and wastes of their crops," Dr. Knight explained. "We ought to make it clear that competition and the cost of producing the new products will determine largely whether or not they are practical. Everybody agrees that what is needed under present conditions is a practical way to utilize some of the millions of tons of waste material on the farms of the country. Nobody denies the need for this sort of chemical research."

Science News Letter, February 20, 1937

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5-DAY MONEY-BACK GUARANTEE
Emerson Books, Inc., Dept. 832-S, 251 W. 19th St., N.Y.C.

ENGINEERING

One-Cylinder Auto Comes to America

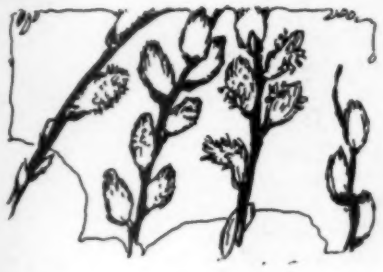
A ONE-CYLINDER midget automobile, the British-made Rytecraft Scoota Car, is about to invade the U.S. market, having won considerable popularity abroad. This vehicle has an overall length of eight feet, and with its 2½ horsepower rear-mounted engine is said to attain a maximum speed of 45 miles per hour, using one gallon of gasoline every eighty miles. The manufacturers of the Scoota Car claim that parking is made easy by standing the vehicle on end.

Science News Letter, February 20, 1937

● RADIO
Feb. 23, 5:15 p.m., E.S.T.
WAKING FROM WINTER SLEEP—Dr. Hartley Jackson of the U. S. Bureau of Biological Survey.
March 2, 5:15 p.m., E.S.T.
JUNGLE AND DESERT AMERICANS —Dr. Vincent Petrullo, explorer, anthropologist.
In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

PHENOLOGY

NATURE RAMBLINGS
by Frank Thone



Impatient Awakenings

WE LEARNED to sing, in nursery and kindergarten days, of the sun and warm spring winds shaking sleepy-headed violets and buttercups out of their beds, as if they were reluctant to be awakened after their long nap. But this certainly is not true of all plants. Many of them are most impatient about staying abed a day longer than they must; they will even come out indiscreetly early and get their noses nipped by quite legitimate and timely freezes.

We have been treated to exactly such a spectacle during the past few weeks. All through the East and Southeast, there has been most untimely warmth for the season. Forsythias, honeysuckles, and any number of other kinds of ornamental shrubs have been popping their buds open, only to be chilled by sudden puffs of freezing air from the far reaches of Alaska and northwestern Canada. More serious, because people's livings are involved, has been the premature flowering of fruit trees in Georgia and other states in the Deep South. Some orchardists even resorted to the desperate expedient of burying cakes of ice among the roots of their trees, hoping to chill them into decent dormancy by that means.

But there are plenty of plants that regularly open their flowers before it can fairly be called spring. Skunk cabbage, pussy willows, soft maples, alders are among the hardy folk of the woods that scatter their pollen to the four winds while said winds are still too chilly for the more delicate, if showier, spring flowers that wait kindlier airs—and the insects that must minister to their seed-making processes. Witch hazel also is a late-winter bloomer—but this queer shrub blossoms only in the winter, when it comes to that; its stringy yellow flowers can be found until the ground freezes hard in December, and again just as soon as late January thaws give shadow of leave for blossoming.

All these pre-spring flowers, as well as practically all of the flowers that blossom before the middle of May, are perennials, using up sugar or starch stored in woody stem or underground fleshy rootstock or bulb to meet the imperious demands for material and energy imposed by the rapidly developing flower structures.

Science News Letter, February 20, 1937

METEOROLOGY

Flood Rains Broke Records During Month of January

WITH the flood situation now out of its first emergency phase, the U.S. Weather Bureau has taken time to size up and summarize the rains that brought the great rivers out of their banks. During January, the meteorologists state, Tennessee, Kentucky, Ohio, and Indiana had three times the normal rainfall for that month. It was the heaviest January precipitation on record for these states.

Total rainfall for the month averaged 15.37 inches in Kentucky, 14.67 inches in Tennessee, 9.82 inches in Indiana, and 9.36 inches in Ohio. The enormous amount of water represented by these excessive rains is indicated by the fact that for Kentucky alone the total was nearly 45 billion tons.

Several states on the borders of the flood region, and even outside it, also took a heavy soaking. New York, Pennsylvania, Virginia, West Virginia, Maryland, North Carolina, Arkansas, and Kansas all broke their respective January precipitation records.

At the same time, however, rain- and snowfall shortage continues to be reported from parts of the West. From the Rocky Mountains westward, including Montana, all states are short of the normal for the season. The Washington average was only slightly more than half the January normal.

The Southeast continues to suffer anxiety over unseasonable warmth. Vegetation over a large area continues to be dangerously advanced, fruit trees are in full bloom, and in southern Georgia pear trees have actually set fruit. A sudden cold storm from the northwest could be ruinous.

Science News Letter, February 20, 1937

ANTHROPOLOGY

New Type Stone Age Skull Found in Southern Germany

A SKULL of an entirely new type of ancient human being, older than Neandertal man, resembling him in some respects yet more "modern" in others, has been discovered in a gravel pit at Steinheim, near Stuttgart, Germany. It has been subjected to critical scientific examination by Dr. Fritz Berckhemer of the Württemberger Museum of Natural History.

The skull was very little broken, and lacks only the lower jaw and a few fragments of the facial bones. It resembles the Neandertal type especially in the characteristic pronounced eyebrow ridges, the wide nasal opening, the massive upper jaw, and the rather low cranial arch. It is markedly different in being shorter, relatively wider, and much more rounded off at the back, and in having considerably less backslope to face and forehead. In these respects it is more like modern man, *Homo sapiens*.

The antiquity of the Steinheim skull is unquestionable. In the gravel pit with it, and extending up to a level about four feet above the location of the skull itself, were bones, teeth, and tusks of an ancient species of elephant, that disappeared from Europe before the end of the pleistocene Ice Age. From geological evidence available, Dr. Berckhemer has concluded that the new skull is two or three hundred thousand years younger than the famous Heidelberg jaw, but somewhat older than typical Neandertal man. He does not regard Steinheimer man as directly ancestral to Neandertal man, but thinks that the resemblances between them can be explained better by regarding them both as descendants from a still unknown common ancestral stock.

Science News Letter, February 20, 1937

VITALISM
and
MECHANISM
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*First Glances at New Books

Biography

THE COLOSSUS OF ROADS, A LIFE OF JOHN LOUDON MCADAM—Roy Devereux—*Oxford,* 184 p., illus., $3. Macadam roads are almost synonymous, the world over, with crushed stone surfaces for highways. Seldom realized is the fact that the name is a living memorial to the Scotsman who, at the turn of the 19th century, began to get the British Isles and eventually much of the whole world "out of the mud." Here his ancestors, life and work are attractively described with copious illustrations.

Science News Letter, February 20, 1937

Documentation

MICROPHOTOGRAPHY FOR LIBRARIES, PAPERS PRESENTED AT THE MICROPHOTOGRAPHY SYMPOSIUM AT THE 1936 CONFERENCE OF THE AMERICAN LIBRARY ASSOCIATION—edited by M. Llewellyn Raney—*American Library Assn.,* 138 p., $2.50.

Science News Letter, February 20, 1937

Hygiene

ROADS TO HEALTH AND HAPPINESS—Oscar C. Mueller—*Prentice-Hall,* 137 p., $2. In this simply written book a layman, without trying to take the place of a physician, sets up moderation and cheerfulness as aids to health and happiness. Sound enough teaching, which unfortunately lacks the sensational appeal that seems necessary to "sell" the type of reader who wants a sure, quick cure or specific preventive for every ail and misfortune.

Science News Letter, February 20, 1937

Medicine

MANUAL OF CLINICAL LABORATORY METHODS (2nd rev. ed.)—Pauline S. Dimmitt—*F. A. Davis Co.,* 193 p., illus., $2.75.

Science News Letter, February 20, 1937

Medicine

INTERPRETATION OF LABORATORY FINDINGS—Raymond H. Goodale—*F. A. Davis Co.,* 170 p., $2.25. Primarily for physicians but also of possible usefulness to nurses and clinical laboratory workers.

Science News Letter, February 20, 1937

Chemistry

ORGANIC CHEMISTRY, THE CHEMISTRY OF THE COMPOUNDS OF CARBON—Lucius Junius Desha—*McGraw-Hill,* 750 p., $3.75. Text used at Washington and Lee University by students who are to take only one year of organic chemistry. Prof. Desha has felt that even the best of these students all too often fail to appreciate the basic principles. This text strives to overcome this difficulty.

Science News Letter, February 20, 1937

Zoology

OPINIONS RENDERED BY THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE: OPINIONS 124 TO 133—*Smithsonian Inst.,* 44 p., 15c.

Science News Letter, February 20, 1937

Engineering

MOVING THE EARTH—Charles Pierce Burton—*Holt,* 255 p., $2. The author is no Atlas of mythology, as one might suspect from the title, but he writes a pleasing book for boys and girls who want to know the why of mining and engineering and its relation to geography.

Science News Letter, February 20, 1937

General Science

SENIOR SCIENCE, SOCIALIZED FOR THE HIGH SCHOOL—George L. Bush, Theodore W. Ptacek, and John Kovats, Jr.—*American Book Co.,* 835 p., illus., $2.20. The outgrowth of an eight-year experiment with an integrated science course in the senior high school, this text by Cleveland teachers differs from the usual physics and chemistry text in that it cuts boldly across subject-matter lines, stresses applications rather than theory, and directs special attention to the social implications of the subject matter.

Science News Letter, February 20, 1937

Chemistry

A TEXTBOOK OF ORGANIC CHEMISTRY FOR STUDENTS OF THE MEDICAL SCIENCES (2nd ed.)—Dr. Hugh C. Muldoon—*Blakiston's,* 590 p., illus., $3.

Science News Letter, February 20, 1937

Chemistry

ESSENTIAL PRINCIPLES OF ORGANIC CHEMISTRY—Charles S. Gibson—*Cambridge* (*Macmillan*), 548 p., $5. A British text designed for those who will eventually specialize in organic chemistry or in such related sciences as biochemistry, physiology, pharmacology and therapeutics. Emphasis on laboratory work and a good index add value.

Science News Letter, February 20, 1937

Industrial Chemistry

PERFUMES, COSMETICS AND SOAPS, WITH ESPECIAL REFERENCE TO SYNTHETICS; VOL. III, MODERN COSMETICS (5th Ed.)—William A. Poucher—*Van Nostrand,* 228 p., $7. Any book which can go into its fifth edition has considerable merit, and this handbook of the formulae necessary to make anything from hair tonic to cosmetics and sunburn preparations will probably continue to interest manufacturers. How many of the stock mixing directions are the backbones of numerous proprietary compounds no one has any way of knowing.

Science News Letter, February 20, 1937

Chemistry

INTRODUCTION TO THEORETICAL CHEMISTRY—William Buell Meldrum and Frank Thomson Gucker, Jr.—*American Book Co.,* 614 p., $3.50. A comprehensive text on the subject which has proved its merit in several years' use at Northwestern University and Haverford College from whence come the authors. Problems and exercises accompany most of the chapters.

Science News Letter, February 20, 1937

Physics

ELEMENTS OF NUCLEAR PHYSICS—Franco Rasetti—*Prentice-Hall,* 327 p., $4.50. One of the best known of Italian physicists reviews the recent progress in the growing field of nuclear research. Both theory and experiment are described in a well-balanced book which all research physicists will want to own whether or not they are working in this fascinating field. In such a fast moving field as nuclear research it is important to state that material published up to the summer of 1936 is included.

Science News Letter, February 20, 1937

Chemistry

ELECTRON DIFFRACTION—R. Beeching—*Chemical Publishing Co.,* 107 p., $1.25. A compact British monograph reviewing this new field of physical research which started with the memorable experiments of Davisson and Germer at the Bell Telephone Laboratories.

Science News Letter, February 20, 1937

Welding

LESSONS IN ARC WELDING—*Lincoln Electric Co.,* 128 p., 50c. Forty-four looseleaf lessons attractively bound, which introduce the novice to welding.

Science News Letter, February 20, 1937